

A Model for Sustainable Environmental Management

Marine Corps Base Camp Lejeune North Carolina

*Environmental
Management
Department*



Introduction

Marine Corps Base Camp Lejeune, North Carolina is a Department of Defense model for sustainable environmental management. From its origin in 1941, Camp Lejeune has used and managed its land and natural resources to maintain combat readiness. Today we must continue to meet this mission while minimizing pollution, preserving natural settings, and complying with Federal, State and local environmental laws.

Conserving our Cultural and Natural Resources

Conserving natural resources and protecting military training capabilities is essential to achieving sustainability. The Environmental Management Department (EMD) staff balances conservation of resources with the military training mission.

Restoring the Land and Water

Some past industrial practices were not compatible with the Eastern North Carolina coastal environment. As a result, Camp Lejeune is now restoring land and groundwater resources to their natural condition.

Assuring Environmental Quality

Camp Lejeune's current activities and plans for future development require knowledge and compliance with State and Federal laws and regulations. EMD understands and teaches the latest requirements, plans for environmentally sustainable development, and assures regulatory compliance.

Preventing Pollution

A cornerstone of sustainable management, Camp Lejeune leads the Marine Corps and Department of Defense (DoD) with broad-based, proactive programs to prevent air, water, and land pollution. Solid Waste recovery and reuse, further diminish Camp Lejeune's impact on the natural setting.

Cultivating Relationships

Camp Lejeune's commitment to the community has forged cooperative working relationships with local, State and Federal agencies to improve environmental quality.

Applying New Technologies

Camp Lejeune proactively implements new technologies to ensure the accomplishment of mission requirements, now and in the future.

Looking to the Future

With the demand for natural resources continuing to increase, the need to find alternatives for their supply is also increasing. Sustainability focuses on improving the economic and social quality of life while limiting our impact on the environment. Through sustainability, natural resources can be protected without impacting the military training mission and quality of life.

The Military Mission



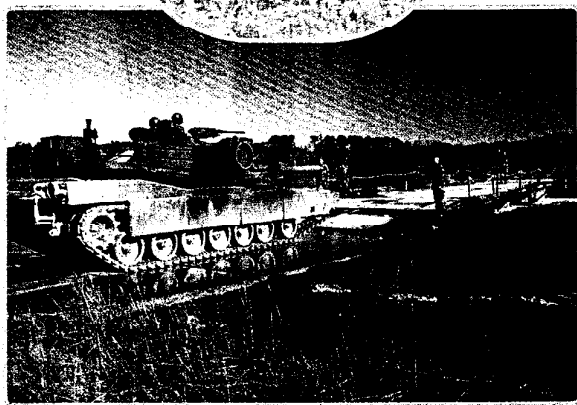
Marine Corps Base Camp Lejeune is the largest and most comprehensive amphibious training facility in the world. The Base is home to the Marine "Expeditionary Forces in Readiness" including the 2d Marine Division, the 2d Force Service Support Group and the Command Element II Marine Expeditionary Force. The Base also provides services for over 145,000 Marines, sailors and their families.

Environmental Profile

Camp Lejeune consists of 153,000 acres with 26,000 riverine and estuarine acres. There are 11 miles of coastline, 450 miles of roads, 37 miles of railroads, a 15 million gallon per day wastewater treatment plant, 5 drinking water plants, and a State permitted landfill located on Base.

Unique environmental challenges include:

- Treatment of most drinking water and domestic wastewater on site
- Permitted landfilling of non-hazardous solid waste on site
- Recycling or reuse of over 40% of solid waste generated
- Operation of 82 permitted air sources
- Annual disposal of approximately 260,000 pounds of hazardous waste from 178 accumulation sites
- Monitoring/remediation of 112 underground storage tank sites
- Management of ecosystems including long-leaf pine forests, salt marsh estuaries, pocosin wetlands and barrier islands
- Administration and management of commercial forestry program on 99,900 acres of land
- Preservation and protection of hundreds of historic and cultural resources
- Husbandry of 6 endangered plant and animal species



Camp Lejeune provides extensive military training opportunities for five major Marine Corps and two Navy Commands.

Conserving Cultural and Natural Resources

Camp Lejeune is rich in cultural and natural resources. The soil and water resources that make the Base an ideal amphibious warfare training facility demand extreme care to ensure its continued viability.

Conserving Cultural Resources

Cultural Resources Management

Camp Lejeune manages hundreds of archaeological sites and historic buildings and structures. Approximately 200 buildings, which were constructed during the mobilization of World War II, are eligible for listing on the National Register of Historic Places.



Hundreds of original Base structures are still in use today, including this barracks constructed in 1941.

Conserving Natural Resources

Fish and Wildlife Management

Camp Lejeune has a 30-year history as one of DoD's premier fish and wildlife management programs. These programs focus on: threatened, endangered, and rare species protection; and game and nongame management.



Camp Lejeune's dedication to protecting cultural and natural resources will ensure sustainability in years to come.

Threatened, Endangered and Rare Species Protection

Camp Lejeune's ecosystems are home to several known threatened and endangered plant and animal species.

Among these species are the:

- Red-Cockaded woodpeckers
- Loggerhead and Green Sea Turtles
- Rough-leaved loosestrife plants
- Seabeach amaranth plants
- Right and three other species of whales migrating along Camp Lejeune's coastal waters
- Other migrating species including Kemp's Ridley and Hawksbill turtles, peregrine falcons, bald eagles, and piping plovers



Forty-four clusters of the endangered plant species, rough-leaved loosestrife (shown above), occupy wet pine flatwood habitats.

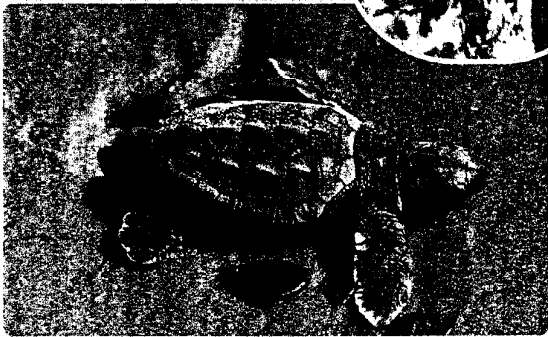
Conserving Cultural and Natural Resources

The integrated management approach to the Red-Cockaded Woodpecker (shown to the right) provides species protection and military training opportunities within the Red-Cockaded Woodpecker habitat.



Red-Cockaded Woodpecker

Camp Lejeune's long-range planning and research for this endangered species has yielded one of the healthiest known red-cockaded woodpecker populations.



Loggerhead and Green Sea Turtles

Camp Lejeune actively protects loggerhead and green sea turtle nests on Onslow Beach cooperatively with State and Federal Agencies.

Relocating sea turtle nests to protected areas on Onslow Beach protects the species and allows amphibious training exercises to continue.



The American alligator is relatively abundant in Camp Lejeune's swamps and waterways.



The Base supports a population of approximately fifty-five Black Bears.

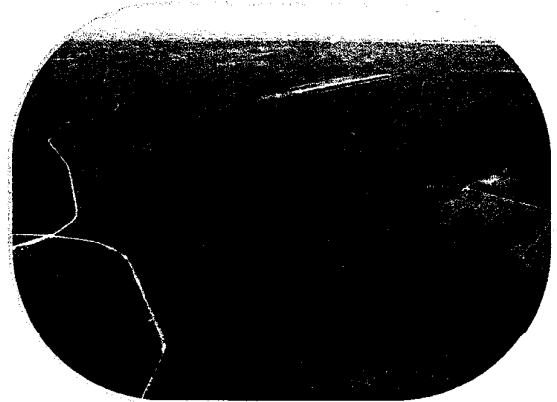
Game and Nongame Management Program

Camp Lejeune's Game and Nongame Management Program maintains healthy populations of wildlife and inland freshwater fisheries through scientifically based conservation techniques. Game species include white-tailed deer, wild turkey, bobwhite quail, and black bear. Nongame species include the American alligator, eastern bluebird, and other neo-tropical migrant landbirds.

Conserving Cultural and Natural Resources

Wetlands and Soils Conservation Program Wetland Mitigation Bank

The Greater Sandy Run Area (GSRA) Wetlands Mitigation Bank is one of DoD's largest wetland restoration projects. It includes over 1,250 acres of pocosin, hardwood bottom forest, and wet mineral pine flats, and mitigates environmental impacts from military training range development.



GSRA Wetlands Mitigation Bank.

Soil Conservation Program

The Sedimentation, Erosion and Land Stabilization Working Group (SELSWG) brings together designers, planners, construction officers and civilian personnel to integrate Base efforts to reduce erosion and sedimentation.



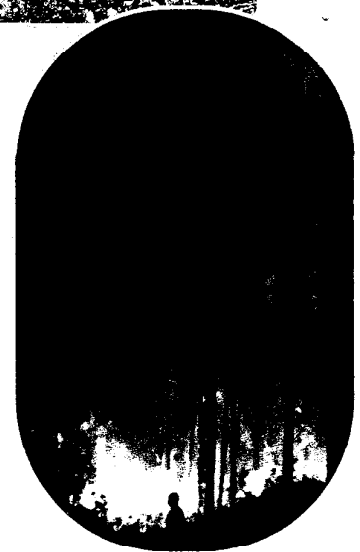
Camp Lejeune takes active measures to prevent erosion problems, such as the one shown above, before they expand in scope.

Forestry Management

The Forestry Division applies sustainable yield, multiple use concepts and ecosystem management principles to effectively balance conservation needs with military training mission requirements.

Examples of ongoing ecosystem management efforts are long (80 to 120 year) timber rotations and the reintroduction of longleaf pine into its former range to establish and maintain longleaf/wiregrass ecosystem biodiversity.

The highly trained wildland fire suppression force, in cooperation with the Base Fire Department, extinguishes 100 fires which burn approximately 2,100 acres annually.



Forestry Wildlands Fire Management.

Conserving Cultural and Natural Resources



Camp Lejeune manages nearly 100,000 acres of commercial forest land.

Commercial Timber Management

The Forestry Division is self-supporting through timber management and provides 40 percent of its net proceeds from timber sales to the Onslow County School System.



Reforestation area.

Reforestation

Reforestation plays a significant role in forest management and in the availability of military training sites. The Forestry Division utilizes natural regeneration techniques whenever possible.



Camp Lejeune's prescribed burning program.

Prescribed Burning

Prescribed burning reduces forest fuels and thus the intensity of wildlands fires.

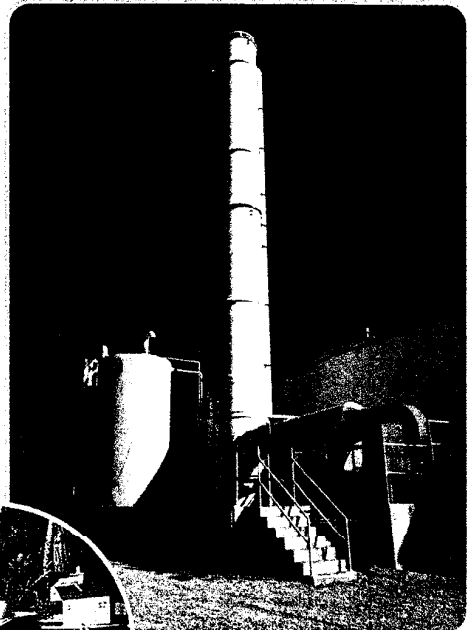
It also reduces brush competition, provides a "natural" burn cycle to fire maintained plants, provides palatable browse for herbivores and maintains varied training landscapes for Camp Lejeune's Marines.

Restoring the Land and Water

Camp Lejeune's primary environmental cleanup challenge is to prevent past disposal practices from threatening the long-term viability of the Base as an amphibious training facility. The Base has undertaken an aggressive approach to site restoration, the success of which will determine its long-term sustainability.

Installation Restoration

Marine Corps Base, Camp Lejeune was listed on the National Priorities List (NPL) in 1989. The Installation Restoration Program is responsible for studying contaminated sites and implementing cost-effective cleanup that protects human health and the environment.



Pump and Treat system for the remediation of groundwater at contaminated site Lot 203.

Groundwater Protection

Protection of drinking water supplies is a vital part of every site restoration project. Thus cleanup of past hazardous waste sites is not merely an effort to comply with Federal and State regulatory requirements, but is essential to the Base's long term viability.



Wells are installed to monitor areas of past contamination and protect groundwater resources.

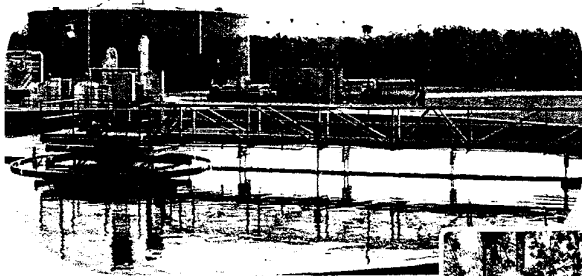
Coastal Dune Restoration

Protecting sand dunes is necessary for future military training and recreational use of the beach. Dune restoration is also important for threatened and endangered species such as loggerhead sea turtles which nest nearby and seabeach amaranth which anchor their roots directly on them.



Camp Lejeune's 11 miles of coastline support military and recreational uses.

Restoring the Land and Water



State of the art - Camp Lejeune's Advanced Wastewater Treatment Plant (above).

Reuse of wastewater residuals for irrigation (right).



Watershed Management

Wastewater reclamation and reuse are the heart of Camp Lejeune's wastewater management effort. Wastewater is reclaimed and used to reduce the demand for potable water, thus reducing effluent wastewater discharge into the New River.



Lead from the impact berm of this small arms range is collected and disposed of to prevent it from leaching into the New River.

Preventative Actions

Camp Lejeune takes a proactive approach to preventing contaminants from entering surface and ground water in addition to remediating past hazardous waste sites.



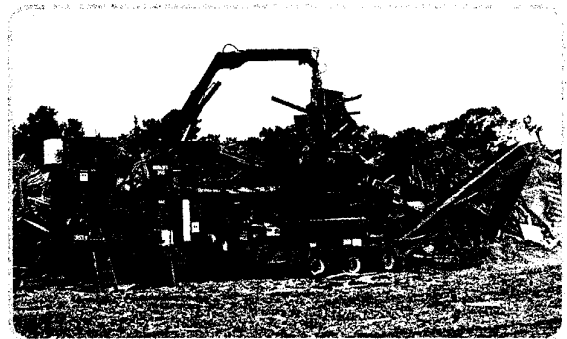
UST removal.

Underground Storage Tanks

Camp Lejeune met Federal and State requirements to replace, upgrade or close all regulated underground storage tanks (USTs) by 1998.

Assuring Environmental Quality

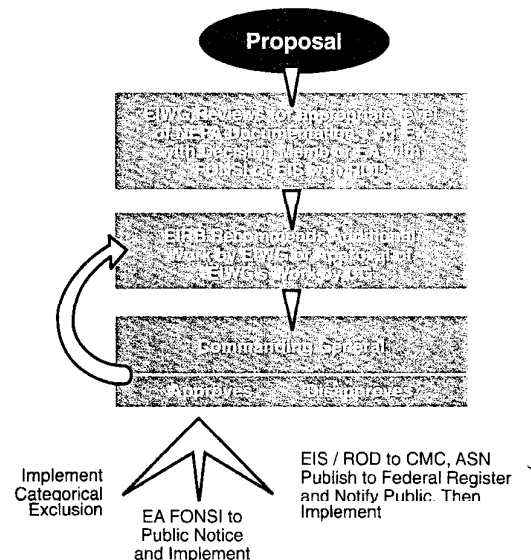
Assuring environmental quality is a challenge because of diverse requirements that must be managed, size of the area, and the number of pollution and hazardous waste sources. The Environmental Quality Assessment Division develops consistent methodologies for the implementation of environmentally sound projects. Environmental awareness is fostered through an environmental training program and assignment of environmental compliance officers and coordinators in all Fleet Marine Force units.



The purchase of an industrial tub grinder enabled Camp Lejeune to reduce its solid waste stream by 20%.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) integrates environmental analysis into Base operations planning and decision-making. The Environmental Impact Working Group addresses the environmental impacts of projects on an individual basis.



Resource Recovery

Camp Lejeune saves millions of dollars each year through waste avoidance, recycling and management. On-site management solutions minimize environmental impacts and reduce offsite disposal expenses.



Aluminum cans are just one of the many items recycled at Camp Lejeune.

Assuring Environmental Quality



CETEP provides environmental training to maintain safe and effective environmental programs.



Environmental Training

Approximately 1,000 military and civilian personnel receive formal environmental training through the Comprehensive Environmental Training and Education Program (CETEP).



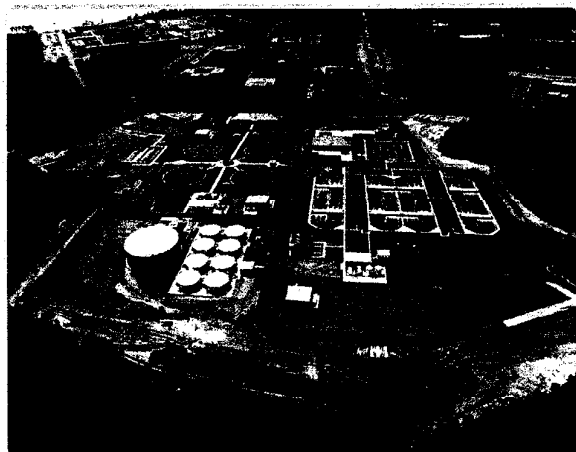
EMD laboratory.

Environmental Monitoring

Environmental monitoring and reporting are the backbone of Camp Lejeune's environmental compliance program. Our laboratory conducts organic sampling with a broad range of pollutant detection and quantification requirements.

Environmental Quality Successes

- New 15 million gallon per day advanced wastewater treatment plant that eliminates 7 secondary treatment plant discharge sites to the New River.
- Reduction in the volume of wastewater discharges to the New River.
- Corrosion control actions and an education campaign to limit potential lead exposure.
- Surpassed Federal and State deadlines for replacement, closure and upgrades of over 500 Underground Storage Tanks (USTs).
- The Base is removing all PCB electrical transformers and initiated a comprehensive tracking system that manages data for 2,550 transformers.
- New permitted double-lined solid waste landfill with leachate collection and groundwater monitoring.
- Camp Lejeune is in full compliance with State and Federal permitting requirements. The Base routinely meets or exceeds regulatory standards.



New Wastewater Treatment facility, aerial view.

Preventing Pollution

Camp Lejeune sets high environmental management standards for DoD and Marine Corps excellence in pollution prevention by implementing innovative, effective environmental programs. This excellence is accomplished by partnerships with Federal and State regulators, other DoD installations and civilian industrial and business communities.

Program Goals

The Pollution Prevention Section routinely evaluates and implements more challenging program goals. Significant progress has been made on the following primary goals:

- Establish a comprehensive Base-wide Pollution Prevention Program with a recycling program
- Develop a consolidated hazardous material management and tracking system
- Develop cooperative relationships with local, State and other DoD organizations
- Develop cost-effective solid waste reuse initiatives



Brass recycling generates revenue to support waste reduction efforts.

Consolidated Hazardous Substance Management System

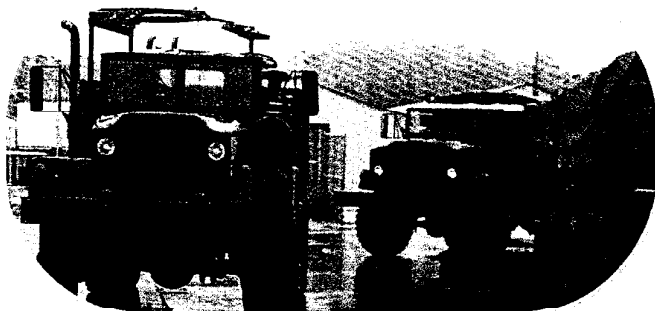
The Consolidated Hazardous Substance Management System (HSMS) provides a quick, accurate means of accounting for hazardous materials and their component chemicals, as well as the accumulation and disposal of hazardous waste.

Partnerships

Camp Lejeune is actively involved in the State/Military Environmental Issues Working Group's Pollution Prevention Subcommittee and directs various on-Base working groups, such as the Solid Waste Reduction Working Group, and Environmental Compliance Officer and Coordinator Meetings.



Preventing Pollution



The Consolidation Center (shown above) is used to procure, handle, store and issue hazardous substances, thus ensuring safety and compliance.

Improved Material Management

Recommendations for improved business practices and process alternatives focus on improving material management while meeting mission requirements. An example is the establishment of a pilot program test site to consolidate hazardous materials.



Through initiatives such as cardboard recycling (shown above), Camp Lejeune is able to divert materials from the solid waste landfill.

Program Initiatives

Camp Lejeune actively protects the environment through its initiatives in the following areas of pollution prevention.

- Material substitution
- Process modification or improvement
- Improved material management
 - Education and outreach
- Research and development
 - Affirmative Procurement
- Solid waste recovery, recycling and reuse
- Consolidation of hazardous waste accumulation sites
 - Quality assurance/analysis of all waste streams

Cultivating Relationships

The establishment and maintenance of relationships is essential to Camp Lejeune's sustainable systems perspective. Camp Lejeune partners with local, State, and Federal agencies and organizations involved in environmental management. EMD Divisions actively participate in advisory boards, working groups, advisory commissions, committees and other groups.

The following organizations highlight the importance of cooperative relationships with the many working groups, review boards and coordination activities at Camp Lejeune.

Environmental Impact Working Group/Review Board

This group assesses proposed projects for potential environmental impacts. Guided by the National Environmental Policy Act (NEPA), the Working Group provides review, research, issue resolution, permit identification, and documentation recommendations.

Restoration Advisory Board (RAB)

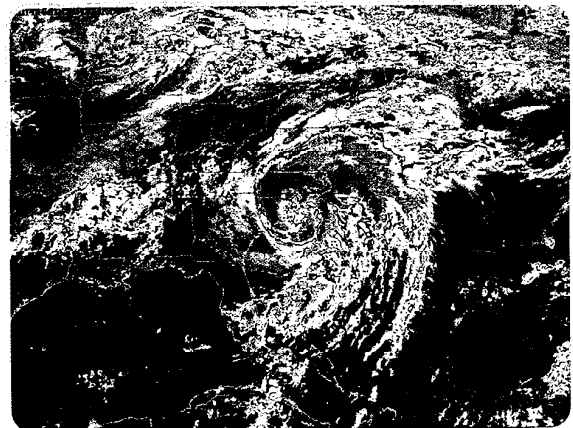
The RAB promotes greater community involvement in the environmental cleanup process and includes representatives from the Marine Corps, Federal and State agencies, local government, and private citizens. The RAB provides a focal point for communicating with the local community and enhances the Base's established public education goals.



Restoration Advisory Board (RAB).

Integrated Geographic Information Repository (IGIR)

Established in 1992 by the Commanding General, Camp Lejeune's integrated Geographic Information System (GIS) is a critical part of the Base's information infrastructure. The IGIR, operated by the Geographic Information Systems Office, serves as a tool to aid in decision-making and process improvement.



The IGIR system is used extensively in preparing for and recovering from hurricanes.

Cultivating Relationships

State/Military Environmental Issues Working Group

The working group consists of key personnel from all North Carolina DoD installations and representatives from the North Carolina Department of Environment and Natural Resources. Through the working group, DoD installations discuss regulatory and environmental issues with their State counterparts.



Existing and future air quality regulations affect Base organizations, such as the Main Steam Plant shown above.

Air Quality Outside Involvement Working Group

Camp Lejeune meets bimonthly with representatives from various industries, environmental interest groups and the North Carolina Department of Environmental and Natural Resources. Camp Lejeune's involvement in the Air Quality Outside Involvement Working Group provides the Base the opportunity to influence the development and application of air quality regulations.



The Cultural Resources Handbook provides guidance for managing archeological sites such as the one shown above, while balancing the military training mission.

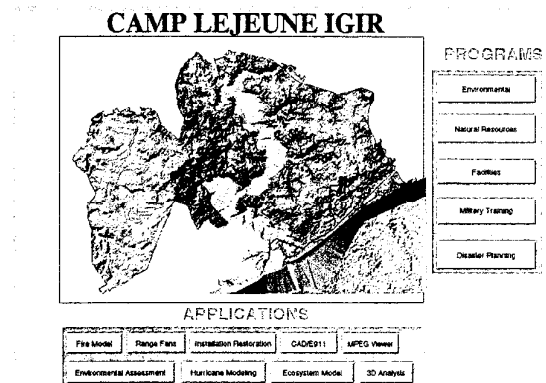
Cultural Resources Management Handbook

Camp Lejeune, in consultation with the State Historic Preservation Officer, is developing a Cultural Resources Management Handbook.

Applying New Technologies

Geographic Information System (GIS)

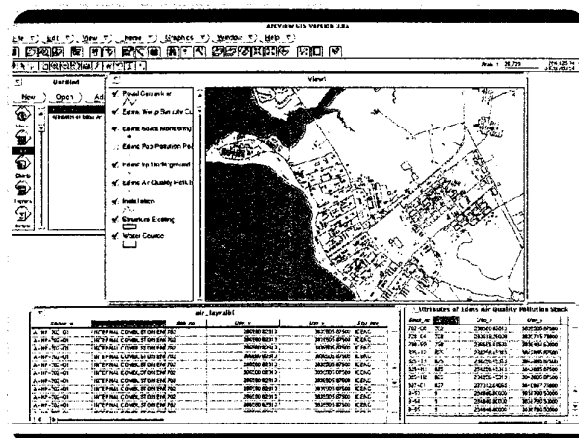
Referred to as the Command Integrated Geographic Information Repository (IGIR), Camp Lejeune's integrated GIS is a critical part of the Base's information infrastructure. The IGIR is a shared resource used by all Base organizations. The EMD applies GIS technology to visualize and analyze data and reveal hidden patterns, relationships, and trends.



IGIR applications.

IGIR In Air Quality Monitoring

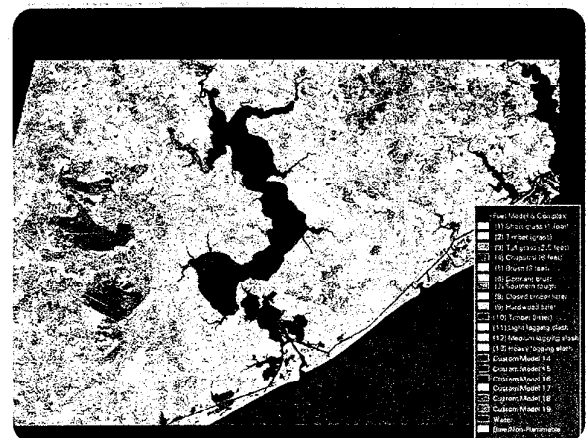
Air quality is assessed annually at Camp Lejeune. Data collected during each study are entered into the IGIR and used to analyze locations of specific pollutant discharge points.



Emission sources.

IGIR Satellite Imagery

Vegetation change detection analysis, performed using satellite imagery from August 1993 and September 1996, revealed the destruction caused by Hurricanes Bertha and Fran in 1996, and the new training ranges being constructed in the Greater Sandy Run Area.



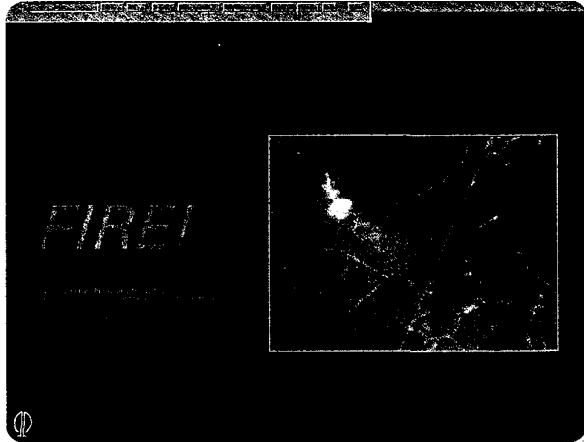
Satellite imagery.

Applying New Technologies

Ecosystem Management Model

A Geographic Information System (GIS) ecosystem management model was developed for the Forestry and Fish and Wildlife Divisions.

The model enhances management of silvicultural practices and other activities on threatened and endangered species, forest community structure, and military training conditions, operations and availability.



Fire Fuels Model.

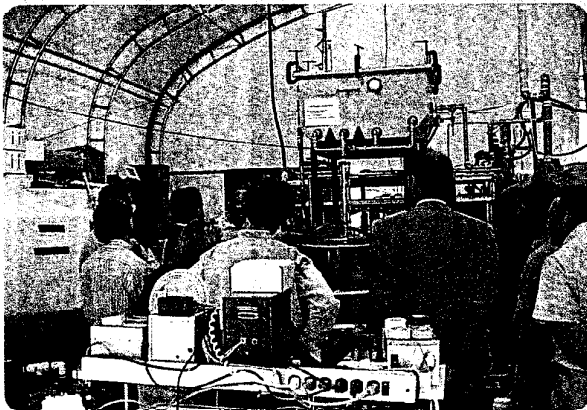
Forestry Fire Fuels Model (FIRE!)

The Forestry Division's nationally recognized GIS Forestry Fire Fuels Model (FIRE!) allows foresters to create time-based scenes of a fire's perimeter, rate of spread, spotting potential and intensities. The FIRE! model received the Deputy Under Secretary of Defense (DUSD) Environmental Security Recognition Award.

Installation Restoration New Technologies

The Installation Restoration Division coordinated a pilot test of Surfactant Enhanced Aquifer Remediation (SEAR) technology. SEAR removes tetrachloroethylene (PCE) from contaminated groundwater at the Base dry cleaning facility.

New Technologies/Research And Development



Pilot test evaluated the recovery of PCE and surfactant from contaminated groundwater.

Camp Lejeune continually seeks emerging technologies to meet the demands of today's challenging environmental issues. The Base routinely studies and plans methods to eliminate or minimize pollutants, hazardous materials, and hazardous and solid waste. The activities listed below illustrate the diverse applications of new technologies:

- Wastewater Reclamation & Water Reuse Feasibility Study
 - EPA Biomass to Energy Project
- Environmental Data Management System
- Biological Nutrient Removal Treatability Study
- Small Arms Range Soils Remediation Demonstration
 - Landfill Gas to Energy Feasibility Analysis
- Pollution Prevention Opportunity Assessment
 - Pollution Prevention Plan
- Solid Waste Management Plan
 - Thermal Part Cleaners
- Cold Solvent Assessment
- Reuse of compact disks

Looking to the Future

Marine Corps Base Camp Lejeune is committed to a 21st Century of sustainable environmental management. Our land, water and airspace resources allow Camp Lejeune to be the world's largest and most complete amphibious training facility.

Through our systems approach to sustainability, we are focusing our management towards conserving natural and cultural resources, restoring land and water resources, assuring environmental quality and preventing pollution, to ensure Camp Lejeune's viability for future generations.

New challenges are ahead -

Conserving Cultural and Natural Resources

Our natural resources are the foundation for Camp Lejeune's military mission. Our Natural Resources Conservation Program and the Integrated Natural Resources Management Plan will guide the maintenance of these resources for future military training and occupation balanced with preservation of ecosystems and natural settings.

Restoring the Land and Water

Two of Camp Lejeune's ecological treasures are the coastal dunes and the Castle Hayne Aquifer. Both of these dynamic natural systems must be protected and sustained to support future generations.

Assuring Environmental Quality

Through sustainability planning and the application of environmental management systems, Camp Lejeune will provide the leadership and visionary new approaches to assure environmental quality.

Preventing Pollution

Source reduction and pollution prevention are clearly the basis for DoD's emerging environmental policies. Camp Lejeune has already demonstrated the economic viability of these policies. The Base, a national leader in pollution prevention, is committed to leading into the next century.

Cultivating Relationships

To achieve an environmentally self-sustaining Base, we understand that our actions cannot be performed in a vacuum. We must continue to establish and maintain relationships with our local, State and Federal neighbors.

Applying New Technologies

Reaching our goal of sustainability requires diligent understanding and application of proven new analytical information technologies.

The successful environmental programs of Camp Lejeune are far reaching. The programs not only meet demanding State and Federal regulatory requirements, they are a foundation for avoiding future environmental and pollution problems. The correction of past environmental mistakes was the priority of the 1990's. The goal for the 21st Century is to build and maintain sustainable systems that support and protect the training mission at Camp Lejeune.

Tomorrow's Child

Mid-Course Correction

Ray C. Anderson

*Without a name; an unseen face
And knowing not your time nor place
Tomorrow's Child, though yet unborn,
I met you first last Tuesday morn.*

*A wise friend introduced us two,
and through his shining point of view
I saw a day that you would see;
A day for you, but not for me.*



*Knowing you has changed my thinking,
For I never had an inkling
That perhaps the things I do
Might someday, somehow, threaten you*

*Tomorrow's Child, my daughter-son,
I'm afraid I've just begun
To think of you and of your good,
Though always having known I should.*

*Begin I will to weigh the cost
Of what I squander; what is lost
If ever I forgot that you
Will someday come to live here too.*



Created in 1989, Camp Lejeune's Environmental Management Department (EMD) is a model DoD organization. The Assistant Chief of Staff, Environmental Management, leads EMD and is the Commanding General's principal advisor on sustainable environmental management. The Assistant Chief of Staff is assisted by the Deputy, Assistant Chief of Staff, the Geographic Information System and Administration and Finance Offices and five major interrelated divisions: Environmental Quality Assessment, Installation Restoration, Environmental Compliance, Forestry, and Fish and Wildlife.